Solve each system. Check your answers:

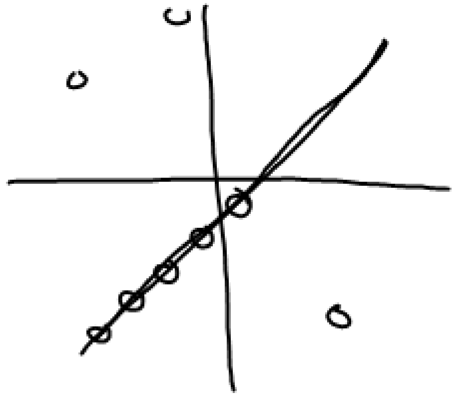
(1)

$$-3\times\quad 2x + 4y = 10$$
$$2\times\quad 3x + 5y = 11$$

$$-\cancel{6x} - 12y = -30$$
$$+\quad \cancel{6x} + 10y = 22$$
$$-2y = -8$$
$$\frac{-2y}{-2} = \frac{-8}{-2}$$
$$y = 4$$
$$2x + 4(4) = 10$$
$$2x + 16 = 10$$
$$-16 \quad -16$$
$$2x = -6$$
$$x = -3$$

(2)

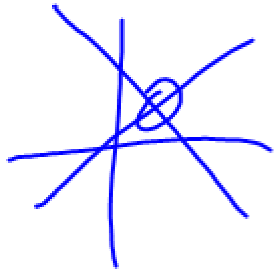
$$4x + 2y = -4 \quad \times 2 \Rightarrow \quad \cancel{8x} + \cancel{4y} = -\cancel{8}$$
$$-8x - 4y = 8 \quad \Rightarrow \quad + \quad -\cancel{8x} - \cancel{4y} = \cancel{8}$$
$$0 = 0$$



→ $0 = 0$

→ dependent

→ no unique solution



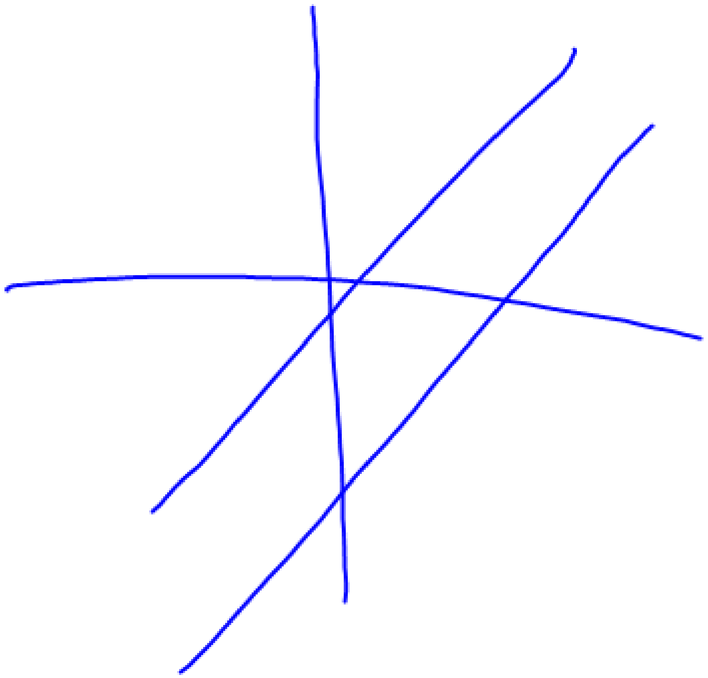
→ $4 = 0$

→ no solution

→ inconsistent

$$2x + 4y = -2 \quad \times 2 \Rightarrow \quad 4\cancel{x} + 8\cancel{y} = -4$$

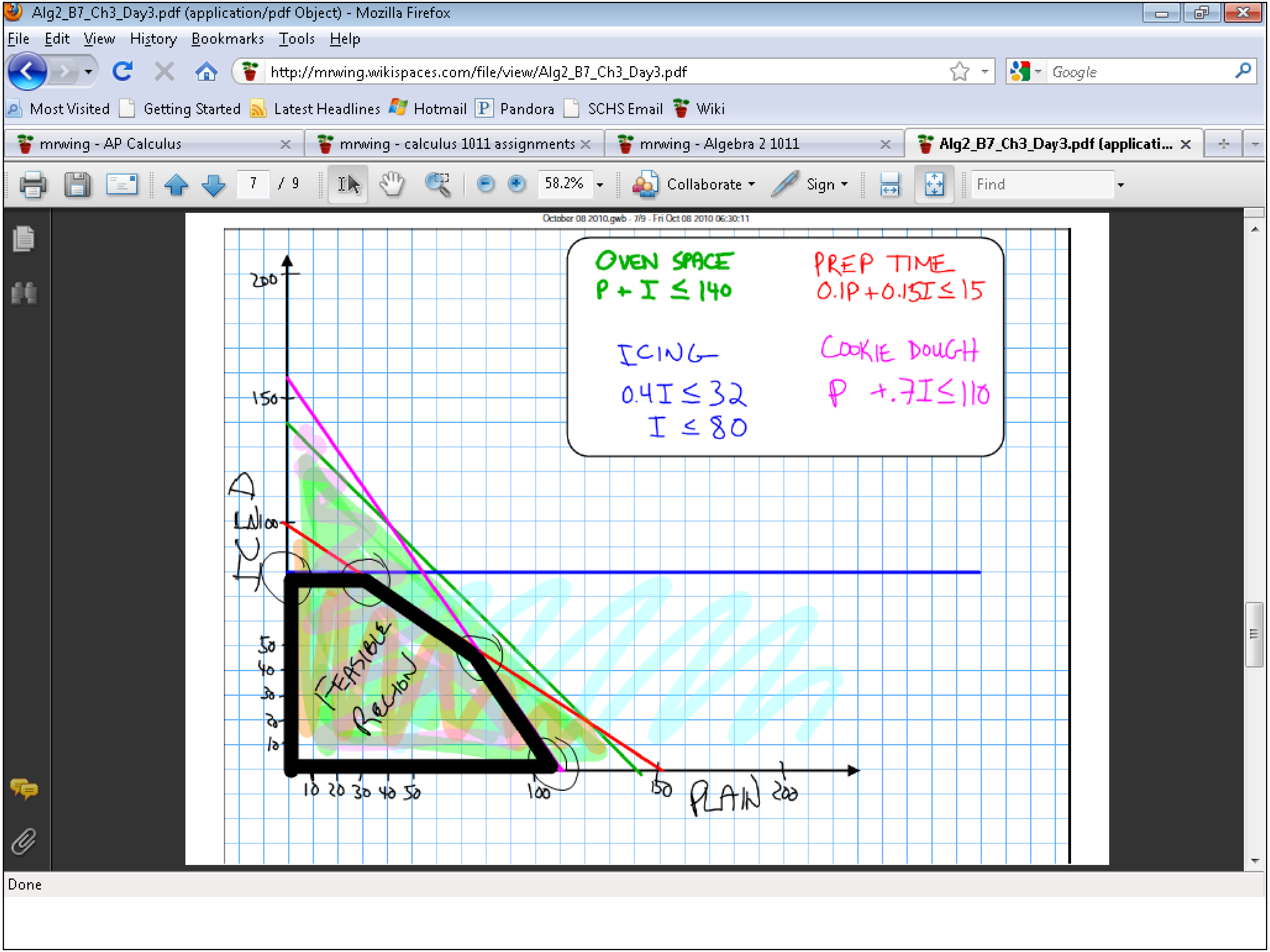
$$4x + 8y = 0 \quad \Rightarrow \underline{-}\left(4\cancel{x} + 8\cancel{y} = 0\right)$$



$\rightarrow 0 = -4$

$\rightarrow$ inconsistent

$\rightarrow$ no solution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ICING
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I ≤ 80
COOKIE DOUGH
P + .7I ≤ 110
FEASIBLE REGION
ICING
PLAIN
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10 20 30 40 50
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Done

1a) $y = -3x + 4$

$y = 7x - 26$

$y = -3x + 4$

$7x - 26 = -3x + 4$

$+3x \quad +26 \qquad +3x \quad +26$

$10x = 30$

$x = 3$

$y = -3(3) + 4$

$y = -9 + 4$

$y = -5$

b) $y = 6x + 2$

$3x - 4y = -29$

1 c) $\times -3$

$$x + 7y = 12 \rightarrow \text{sub} \quad x = 12 - 7y$$
$$3x - 5y = 10$$

$$\begin{aligned}
-\cancel{3x} - 21y &= -36 \\
+ \quad \cancel{3x} - 5y &= 10 \\
\hline
-26y &= -26 \\
y &= 1
\end{aligned}$$

$$x + 7(1) = 12$$
$$x + 7 = 12$$
$$x = 5$$

2a)

	x-int	y-int
$x+y \geq 6$	6	6
$x \leq 8$	8	
$y \leq 5$		5

Minimize for

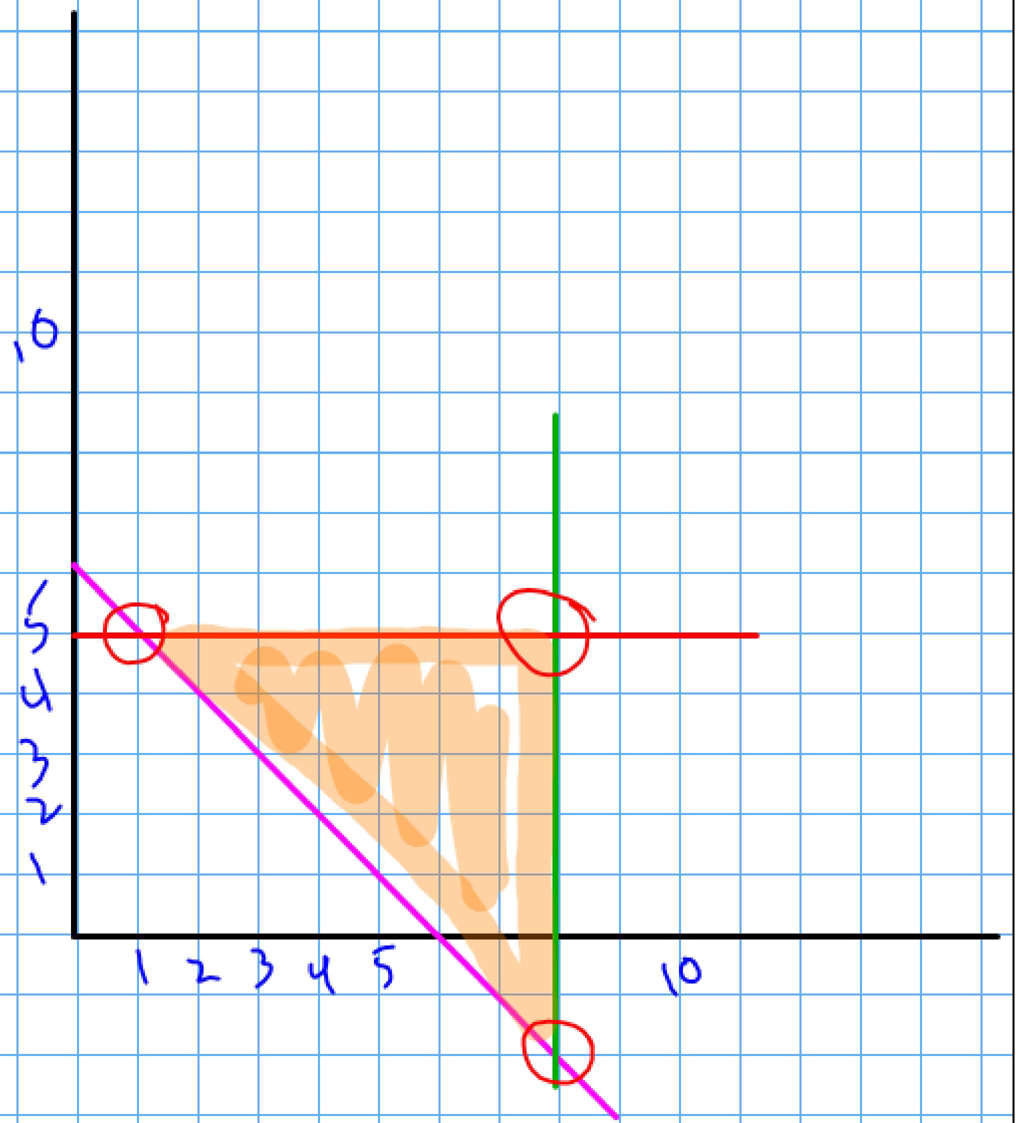
$C = x + 3y$

$(1,5) \Rightarrow 1+3(5)=16$

$(8,5) \Rightarrow 8+3(5)=23$

$(8,-2) \Rightarrow 8+3(-2)=2$

$x=8,\ y=-2$



2 b) $3x + y \le 7$ x-int $\frac{7}{3} = 2\frac{1}{3}$ y-int 7

$x + 2y \le 9$ 9 $\frac{9}{2} = 4\frac{1}{2}$

$x \ge 0$

$y \ge 0$

$(1,4) \Rightarrow 2(1)+4 = 6$

Maximize for $(0,5) \Rightarrow 0+5 = 5$ 10

$P = 2x + y$ $(2\frac{1}{3}, 0)$

$3x + y = 7$

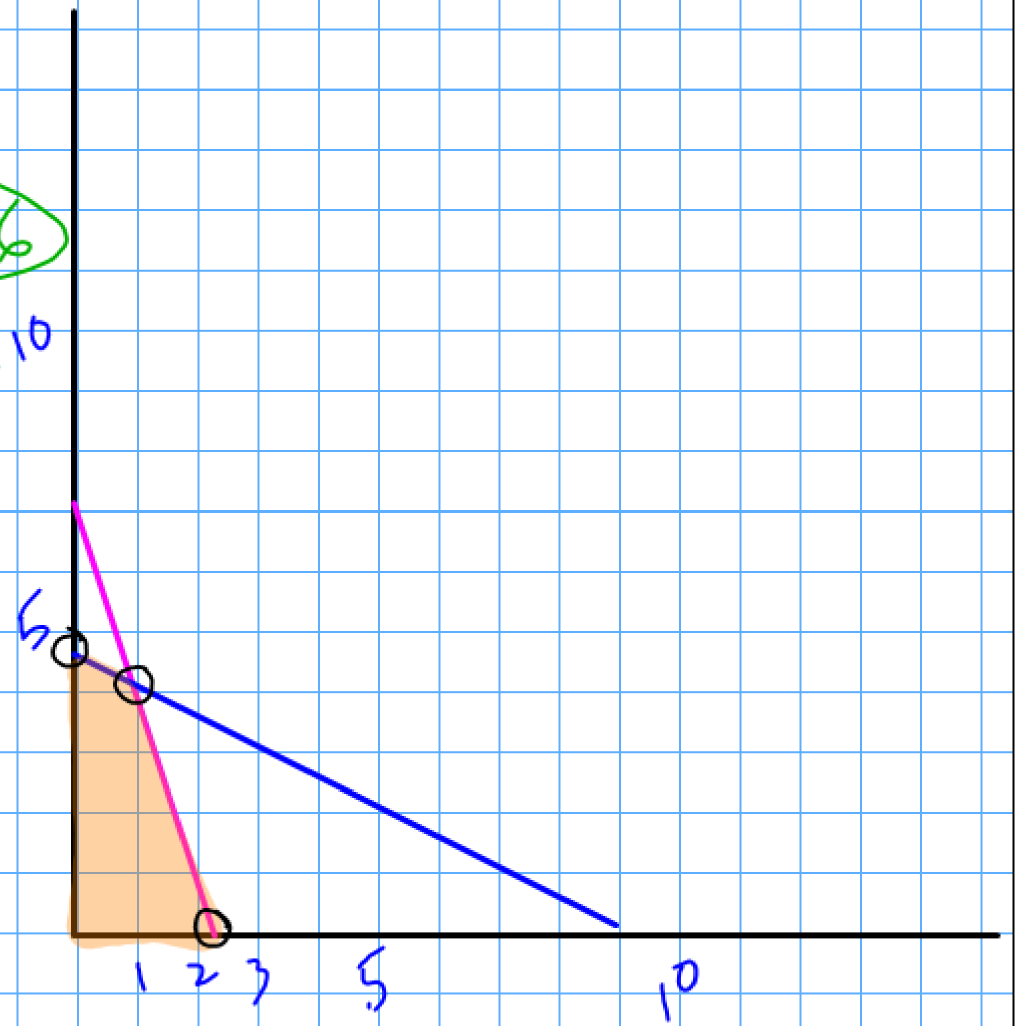
$-3 \times (x + 2y = 9)$

$-\cancel{3x} - 6y = -27$

$\cancel{3x} + y = 7$

$-5y = -20$

$y = 4$



3) Gonza Manufacturing has two factories that produce three grades of paper: low grade, medium grade, and high grade. It needs to supply at least 24 tons of low grade, 6 tons of medium grade, and 30 tons of high grade paper. Factory A produces 8 tons of low grade, 1 ton of medium grade, 2 tons of high grade paper daily, and costs $2,000 per day to operate. Factory B produces 2 tons of low grade, 1 ton of medium grade, 8 tons of high grade paper daily, and costs $4,000 per day to operate.

a) Write the information above as inequalities using *x* for factory A and *y* for factory B.

b) Graph the inequalities and make a clear sketch of the feasible region. Label all relevant points on your graph.

c) How many days should each factory operate to fill the orders at minimum cost? What is the cost to fill the orders?

x = factory A; y = factory B

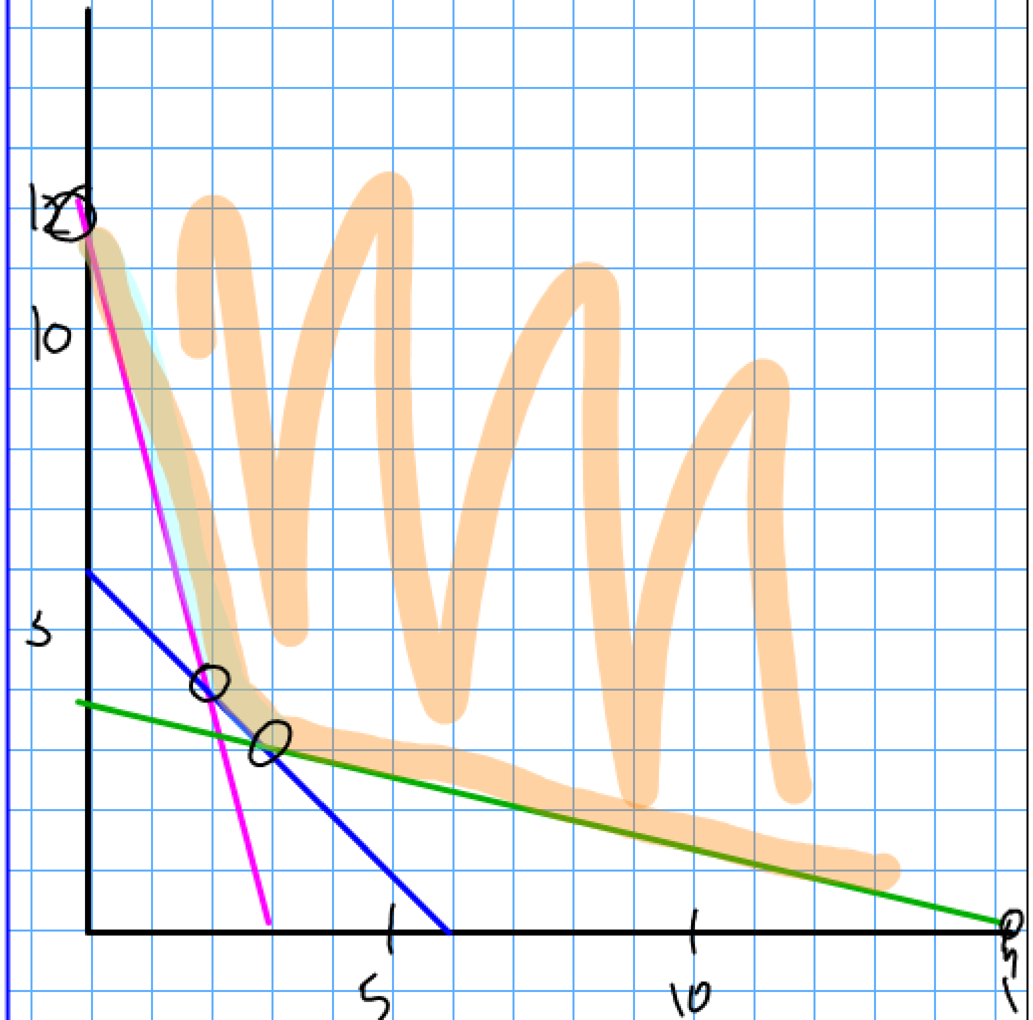
Low : $8x + 2y \geq 24$

Med : $x + y \geq 6$

High : $2x + 8y \geq 30$

minimum cost $= 2000x + 4000y$

	x-int	y-int
$8x + 2y \geq 24$	3	12
$x + y \geq 6$	6	6
$2x + 8y \geq 30$	15	$\frac{30}{8} = 3\frac{3}{4}$



min. cost

$2000x + 4000y$

$(2,4) \Rightarrow 2000(2) + 4000(4)$

$= \$20{,}000$

$(3,3) \Rightarrow 2{,}000(3) + 4000(3)$

$= 6000 + 12{,}000$

$= \$18{,}000$

Both factories op. for 3 days

$18,000

4) Shauna is concerned about her cat Kiwi's diet. She wants to give Kiwi a mixture of canned food and dry food. Each ounce of canned food has 2 grams of protein and 4 grams of fat and costs \$0.10 per ounce. Each ounce of dry food has 6 grams of protein and 2 grams of fat and costs \$0.06 per ounce. ~~Kiwi~~ needs at least 30 grams of protein and at least 16 grams of fat. ~~Kiwi~~ should not eat more than 12 ounces of food per day.

a) Write equations to represent the constraints, using x for canned food and y for dry food.

b) Graph the inequalities and make a clear sketch of the feasible region. Label all relevant points on your graph.

c) How many ounces of each kind of food should Kiwi eat so that the cost is minimized? What is the cost of feeding Kiwi for a day?

x = canned; y = dry food

protein: $2x + 6y \geq 30$

fat: $4x + 2y \geq 16$

food: $x + y \leq 12$

minimize =
cost $.10x + .06y$

	x int	y int
$2x + 6y \geq 30$	15	5
$4x + 2y \geq 16$	4	8
$x + y \leq 12$	12	12

min. cost

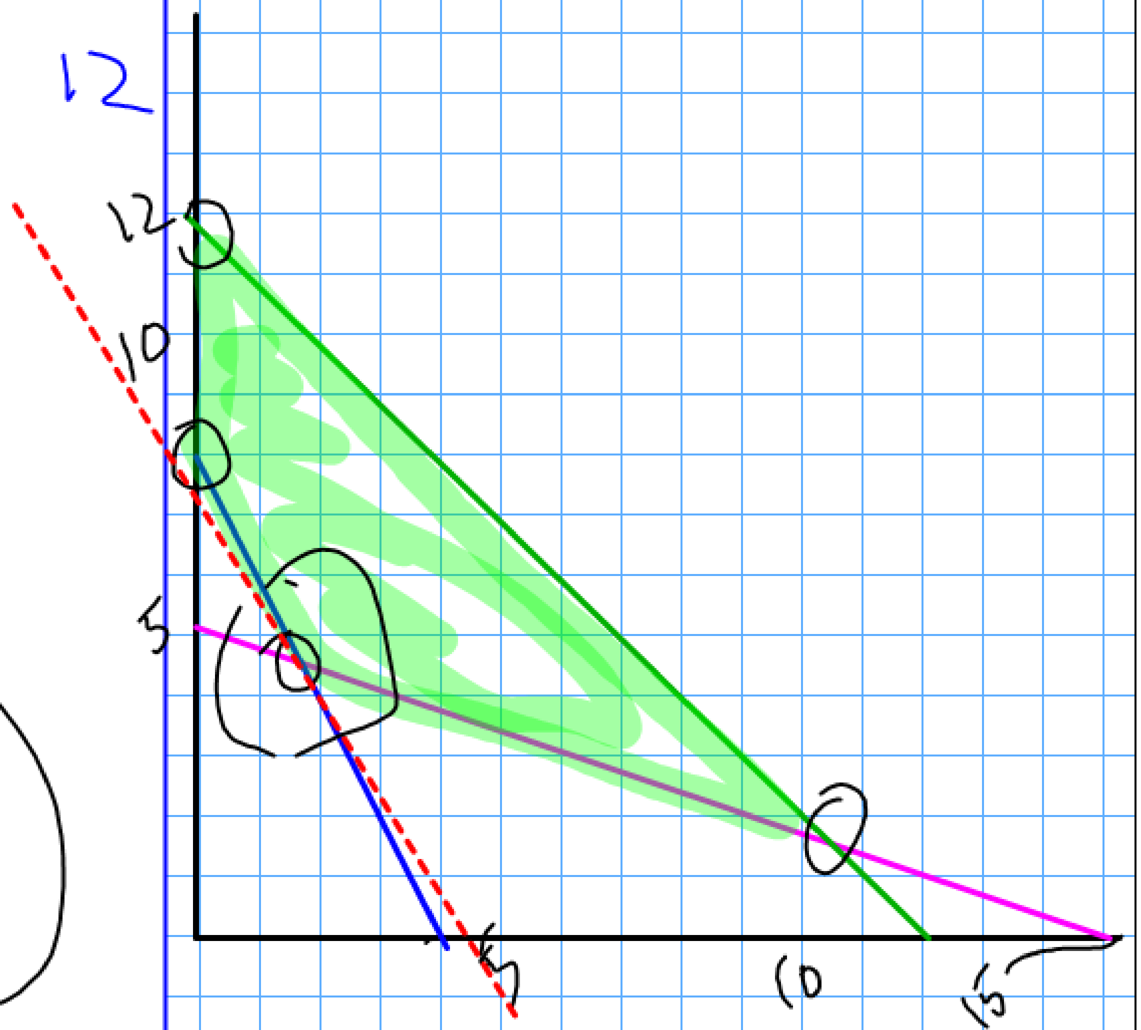
$.1x + .06y = .6$

x-int	y int
6	10

$x = 1.8$

$y = 1.5$

44¢/day



Your group is to make up a linear programming problem. The key ingredients you need to have in your problem are:

1) Two Variables

2) A linear expression using those variables to be maximized or minimized

3) Three or Four constraints

Afterwards, solve it on a SEPERATE piece of paper.